Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1. (currently amended) An optical fiber comprising:

a core; and

a thixotropic cladding layer including a plurality of hydrophilic nano-particles proximate the surface of the core, and a plurality of hydrophobic nano-particles around a layer of the hydrophilic nano-particles[,]

~~wherein the optical fiber is configured for fiber optic communication~~.

2. (Original) The optical fiber of claim 1, wherein the cladding layer includes a filler.

3. (Original) The optical fiber of claim 2, wherein the filler includes at least one of a polymer, synthetic oil, poly-siloxane and Teflon.

4. (Original) The optical fiber of claim 1, further including an overclad layer around the cladding layer.

5. (Previously presented) The optical fiber of claim 4, wherein the overclad layer includes Teflon.

6. (Original) The optical fiber of claim 1, wherein the core is a silica glass core.

7. (Previously presented) The optical fiber of claim 1, wherein the cladding layer includes nano-particles of at least one of a ceramic, silica, molybdenum disulfide, and a metallic oxide.

8. (Previously presented) The optical fiber of claim 7, wherein the metallic oxide is one of titanium oxide, aluminum oxide and magnesium oxide.

9. (Cancelled)

10. (Previously presented) The optical fiber of claim 1, wherein the cladding layer further comprises hydrophobic nano-particles.

11. (Original) The optical fiber of claim 1, wherein the cladding layer includes a plurality of layers of nano-particles, the plurality of layers having different hydrophobicity characteristics.

12. (Original) The optical fiber of claim 1, wherein the cladding layer includes an inner layer of metallic oxide nano-particles and outer layer of silica nano-particles.

13. (Original) The optical fiber of claim 1, wherein the cladding layer includes an inner layer of molybdenum disulfide nano-particles and outer layer of Teflon.

14. (Original) The optical fiber of claim 1, wherein the cladding layer includes a resin foam.

15. (canceled)

16. (currently amended) An optical fiber bundle comprising:

a plurality of cores; and

a thixotropic cladding layer ~~including a plurality of hydrophilic nano-particles and a plurality of hydrophobic nano-particles~~,

wherein the plurality of cores are embedded within the same cladding layer ~~and the hydrophilic nano-particles are proximate the surface of the plurality of cores~~.

17. (currently amended) The optical fiber bundle of claim 16, wherein the cladding layer includes a filler.

18. (currently amended) The optical fiber bundle of claim 17, wherein the filler includes at least one of a polymer, synthetic oil, poly-siloxane and Teflon.

19. (currently amended) The optical fiber bundle of claim 16, further including an overclad layer around the cladding layer.

20. (currently amended) The optical fiber bundle of claim 16, wherein the cladding layer includes nano-particles of at least one of a ceramic, silica, molybdenum disulfide and a metallic oxide.

21. (currently amended) The optical fiber bundle of claim 16, wherein the cladding layer further comprises hydrophobic nano-particles.

22. (currently amended) An optical transmission structure comprising:

a substrate;

a waveguide on the substrate; and

a thixotropic cladding layer in direct contact with the waveguide ~~and including a plurality of hydrophilic nano-particles over the waveguide, and a plurality of hydrophobic nano-particles over the hydrophilic nano-particles~~.

23. (Original) The optical transmission structure of claim 22, wherein the cladding layer includes a filler.

24. (Original) The optical transmission structure of claim 23, wherein the filler includes at least one of a polymer, synthetic oil, poly-siloxane and Teflon.

25. (Original) The optical fiber of claim 22, wherein the nano-particles are formed of at least one of a ceramic, silica, Teflon, molybdenum disulfide and a metallic oxide.

26. (previously presented) An optical transmission structure comprising:

a substrate;

a plurality of waveguides stacked on the substrate; and

a thixotropic cladding layer including a plurality of hydrophilic and hydrophobic nano-particles over the waveguides and between the waveguides.

27. (Original) The optical transmission structure of claim 26, wherein the cladding layer includes a filler.

28. (Original) The optical transmission structure of claim 27, wherein the filler includes at least one of a polymer, synthetic oil, poly-siloxane and Teflon.

29. (Original) The optical transmission structure of claim 26, wherein the waveguides are silica glass waveguides.

30. (Previously presented) The optical transmission structure of claim 26, wherein the nano-particles include at least one of a ceramic, silica, molybdenum disulfide and a metallic oxide.

31. (Cancelled)

32. (Previously presented) The optical transmission structure of claim 26, wherein the cladding layer further comprises hydrophobic nano-particles.

33. (currently amended) A method of manufacturing a fiber structure comprising the steps of:

forming a fiber core; and

coating a fiber core with a thixotropic cladding layer that includes hydrophilic nano-particles~~, wherein the fiber structure is configured for fiber optic communication~~.

34. (Original) The method of claim 33, further including the step of forming an overclad layer over the cladding layer.

35. (Original) The method of claim 33, wherein the coating step forms an inner layer of nano-particles, and an outer layer of nano-particles, the inner and outer layers having dissimilar hydrophobicity.

36. (Original) The method of claim 35, wherein the coating step includes the step of negatively charging the fiber core, positively charging the inner layer, and negatively charging the outer layer.

37. (Previously presented) The method of claim 35, wherein the inner layer includes metallic oxide nano-particles, and the outer layer includes silica nano-particles.

38. (Original) The method of claim 33, wherein the coating step includes the step of immersing the fiber structure in a water-alcohol medium that includes the nano-particles.

39. (Original) The method of claim 33, wherein the coating step includes the step of drying the fiber structure azeotropically.

40. (Original) The method of claim 33, wherein the coating step includes the step of drawing the fiber core through a paste that includes the nano-particles.

41. (Original) The method of claim 33, wherein the coating step includes the steps of:
applying a polymer with the nano-particles to the fiber core; and
drying the polymer.

42. (Original) The method of claim 33, wherein the coating step forms the cladding layer that includes a filler in which the nano-particles are embedded.

43. (previously presented) A method of manufacturing a light transmission structure comprising the steps of:
forming a waveguide on a substrate; and
forming a thixotropic cladding layer on the waveguide~~, the cladding layer including hydrophilic nano-particles proximate the waveguide and hydrophobic nano-particles over the hydrophilic nano-particles~~.

44. (previously presented) An optical fiber comprising:
a core; and
a thixotropic cladding layer including a plurality of nano-particles around the core, wherein the cladding layer includes an inner layer comprised of hydrophilic metallic oxide nano-particles and outer layer comprised of hydrophobic silica nano-particles.

45. (currently amended) An optical fiber comprising:
a core; and

a thixotropic cladding layer including a plurality of hydrophobic and hydrophilic nano-particles around the core, wherein the cladding layer includes an inner layer comprised of molybdenum disulfide nano-particles and an outer layer comprised of Teflon.

46. (Previously presented) A method of manufacturing a fiber structure comprising the steps of:

forming a fiber core; and

coating a fiber core with a cladding layer that contains nano-particles, comprising the steps of:

forming an inner layer and an outer layer of nano-particles having dissimilar hydrophobicity; and

negatively charging the fiber core, positively charging the inner layer, and negatively charging the outer layer.

47. (currently amended) A method of manufacturing a fiber structure comprising the steps of:

forming a fiber core; and

coating a fiber core with a thixotropic cladding layer that includes nano-particles;

wherein the coating step forms an inner layer and an outer layer of hydrophilic and hydrophobic nano-particles, respectively ~~, wherein the inner layer comprises metallic oxide nano-particles and the outer layer comprises silica nano-particles~~.

48. (currently amended) An optical fiber comprising:

a core; and

a thixotropic cladding layer around the core and having hydrophobic and hydrophilic nano-particles ~~around the core~~.

49. (Previously presented) The optical fiber of claim 48, wherein the cladding layer further comprises a filler.

50. (canceled)

51. (Previously presented) The optical fiber of claim 49, wherein the filler is hydrophobic.

52. (Previously presented) The optical fiber of claim 48, wherein the cladding layer has an inner region adjacent to the core and an outer region around the inner region; and the inner region comprises the hydrophilic nano-particles and the outer region comprises the hydrophobic nano-particles.

53. (Previously presented) The optical fiber of claim 10, wherein the hydrophobic nano-particles are selected from the group consisting of silica and Teflon.

54. (Previously presented) The optical fiber of claim 1, wherein the hydrophilic nano-particles are in direct contact with the core.

55. (Previously presented) The optical fiber of claim 21, wherein the hydrophobic nano-particles are selected from the group consisting of silica and Teflon.

56. (Previously presented) The optical transmission structure of claim 32, wherein the hydrophobic nano-particles are selected from the group consisting of silica and Teflon.

57. (Previously presented) An optical fiber comprising:

a core;

a thixotropic cladding layer around the core, the cladding layer comprising a plurality of hydrophilic nano-particles forming an inner region of the cladding layer proximate the surface of the core; and

a plurality of hydrophobic nano-particles forming an outer region of the cladding layer.

58. (Previously presented) The optical fiber of claim 1, wherein the nano-particles have diameters in the range of approximately 5 to 150 nm.

59. (Previously presented) The optical fiber of claim 2, wherein the filler comprises air.

60. (Previously presented) The optical fiber of claim 1, wherein an effective refractive index of the cladding layer is approximately unity.

61. (Previously presented) The optical fiber of claim 1, wherein an overall diameter of the optical fiber is between approximately 12 and 15 microns.

62. (Previously presented) The optical fiber of claim 1, wherein the nano-particles are movable within the cladding to serve as bearing rollers.

63. (New) The optical fiber bundle of claim 16, wherein the thixotropic cladding layer includes a plurality of hydrophilic nano-particles and a plurality of hydrophobic nano-particles, and

wherein the hydrophilic nano-particles are proximate the surface of the plurality of cores.

64. (New) The optical transmission structure of claim 22, wherein the thixotropic cladding layer includes a plurality of hydrophilic nano-particles over the waveguide, and a plurality of hydrophobic nano-particles over the hydrophilic nano-particles.

65. (New) The method of claim 43, wherein the step of forming the cladding layer includes placing hydrophilic nano-particles proximate the waveguide and placing hydrophobic nano-particles over the hydrophilic nano-particles.

66. (New) The method of claim 47, wherein the inner layer comprises metallic oxide nano-particles and the outer layer comprises silica nano-particles.